Chapter 1
Introduction

1-1. Purpose

This manual assembles into a single source the current practice in coastal engineering with respect to estimating nearshore wave characteristics, longshore currents, and longshore sand transport rates including a section describing littoral budget methodology. This manual draws upon a large number of sources to present techniques for evaluating these nearshore phenomena. The design engineer is expected to adopt general guidance presented in this manual to site-specific projects; deviations from this guidance are acceptable if adequately substantiated.

1-2. Applicability

This manual applies to all HQUSACE elements and USACE Commands having civil works engineering and design responsibilities.

1-3. References

Required and related publications are listed in Appendix A.

1-4. Objective

This manual presents a method for estimating the significant physical parameters and resulting longshore current and sediment transport under natural conditions at coastal sites.

1-5. Background

The beach is the natural buffer between the land and the sea. It is a highly dynamic zone which responds to storms, seasonal variations, and long-term events such as an El Nino, sea level rise, and land subsidence. Its condition is also controlled by the source and supply of beach materials. Problems frequently arise when human activities attempt to fix the location of this dynamic boundary or alter sediment transport processes in its vicinity. Thus, both natural and human-induced actions produce changes in the beach which are addressed in coastal engineering practice.

1-6. Scope

This manual details orthodox methods presently practiced in coastal engineering for estimating longshore sand transport and littoral budgets. Sufficient introductory material and discussion of the methods are provided to enable a person with an engineering background to obtain an understanding of these coastal processes. The manual includes detailed descriptions of applicable methods, techniques, useful data, and worked examples to illustrate typical approaches.

1-7. Overview of Manual

The manual is divided into seven chapters. Chapter 1 provides a manual overview. Chapter 2 presents an introductory discussion of nearshore concepts. Chapter 3 develops a background on waves and presents techniques for estimating the wave climate. Chapter 4 is a discussion of littoral processes. Chapters 5 and 6 present methods for estimating longshore currents and sediment transport, respectively. In Chapter 7, two example littoral budget calculations are presented. There are also five appendixes: a reference list of required and related publications, a list of notation, a glossary of coastal engineering terminology, a table of unit conversions, and a list of computer programs relevant to wave, current, and sand transport problems that are available from the U.S. Army Engineer Waterways Experiment Station's Coastal Engineering Research Center (CERC).